Xcel Energy®

Monticello Nuclear Generating Plant
2807 W County Road 75
Monticello, MN 55362

March 01, 2012

L-MT-12-021
10 CFR 50.73

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Monticello Nuclear Generating Plant
Docket 50-263
Renewed Facility Operating License No. DPR-22

LER 2011-009-01 "Automatic Reactor Scram While Performing Turbine – Generator Testing"

A supplement to the Licensee Event Report (LER) for this occurrence is attached.

Summary of Commitments

This letter contains no new commitments and no revisions to existing commitments.

Timothy J. O'Connor
Site Vice-President
Monticello Nuclear Generating Plant
Northern States Power Company-Minnesota

Enclosure

cc: Regional Administrator, Region III, USNRC
Project Manager, Monticello Nuclear Generating Plant, USNRC
Resident Inspector, Monticello Nuclear Generating Plant, USNRC

NRC FORM 366 (10-2010) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104 EXPIRES 10/31/2013

Estimated burden per response to comply with this mandatory information collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the FOIA/Privacy Section (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects.resource@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202 (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

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4. TITLE

Automatic Reactor Scram While Performing Turbine – Generator Testing

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
										05000
11	19	2011	2011	- 009 -	01	03	01	2012	FACILITY NAME	DOCKET NUMBER 05000

9. OPERATING MODE

1

10. POWER LEVEL

90%

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)

☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.73(a)(2)(i)(C)	☐ 50.73(a)(2)(vii)
☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☐ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)
☐ 20.2203(a)(1)	☐ 20.2203(a)(4)	☐ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)
☐ 20.2203(a)(2)(i)	☐ 50.36(c)(1)(i)(A)	☐ 50.73(a)(2)(iii)	☐ 50.73(a)(2)(ix)(A)
☐ 20.2203(a)(2)(ii)	☐ 50.36(c)(1)(ii)(A)	☒ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(v)(A)	☐ 73.71(a)(4)
☐ 20.2203(a)(2)(iv)	☐ 50.46(a)(3)(ii)	☐ 50.73(a)(2)(v)(B)	☐ 73.71(a)(5)
☐ 20.2203(a)(2)(v)	☐ 50.73(a)(2)(i)(A)	☐ 50.73(a)(2)(v)(C)	☐ OTHER Specify in Abstract below or in NRC Form 366A
☐ 20.2203(a)(2)(vi)	☐ 50.73(a)(2)(i)(B)	☐ 50.73(a)(2)(v)(D)	

12. LICENSEE CONTACT FOR THIS LER

NAME	TELEPHONE NUMBER (*Include Area Code*)
Carrie Fosaaen, Licensing Engineer	763-295-1357

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
E	TA	65	G080	N	N/A	N/A	N/A	N/A	N/A

14. SUPPLEMENTAL REPORT EXPECTED

☐ YES (If yes, complete 15. EXPECTED SUBMISSION DATE) ☒ NO

15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
	N/A	N/A	N/A

ABSTRACT (*Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines*)

On November 19, 2011, at approximately 2312 CST, during performance of regularly scheduled Turbine-Generator Quarterly Surveillance, an unplanned reactor scram occurred. Following the reactor scram, reactor water level lowered below the Group II isolation initiation setpoint (+9") and an actuation of Primary Containment Isolation System occurred.

The direct cause of the scram was the actuation of the Main Turbine acceleration relay (load rejection) pressure switches. The root cause was ineffective management of Turbine Lube Oil (TLO) Tank Vacuum which resulted in oil build up on the turbine shaft resulting in fouled grounding braids. The shaft grounding device is intended to prevent damage to turbine generator components caused by circulating currents. Resulting circulating currents degraded the speed governor drive gear which resulted in governor oscillations ("bobble") that manifested itself during speed load changer testing and caused pressure oscillations at the acceleration relay (load rejection) pressure switches.

Corrective actions include replacing the TLO Tank Vacuum Indicator with High Accuracy Device, and updating the operator round sheet to reflect new control bands as required. Repairs were also made to the speed governor gear drive components and main shaft oil pump components which were damaged by electrolysis and a modification was performed to install a more robust grounding apparatus.

Energy industry identification system (EIIS) codes are identified in the text within brackets [xx].

EVENT DESCRIPTION

Prior to the event, Monticello Nuclear Generating Plant was in Mode 1 at approximately 90% power.

On November 19, 2011, at approximately 2312 CST, the plant scrammed while performing a Turbine – Generator Quarterly Surveillance Test, which tests the operation of the Speed/Load Changer and Turbine Bypass Valves [V]. The Speed/Load Changer was being lowered to close the Control Valves [V] and concurrently open the Bypass Valves when a Reactor half scram was received followed by a full Reactor scram due to both channels of the Turbine-Generator load reject trip relays [RLY] which receive their signal from oil pressure sensing switches [PIS]. Following the reactor scram, reactor water level lowered below the Group II isolation initiation setpoint (+9 in) and an actuation of Primary Containment Isolation System (PCIS) occurred.

Control Rods fully inserted as expected in response to the Reactor Protection System [JC] (RPS) actuation. Post scram, Reactor Vessel [RPV] water level was controlled using the Feedwater [SJ] and Condensate [SD] systems. No other safety systems actuated or were required to actuate. There was no inoperable equipment at the start of the event that contributed to the event. Off-site power was available and both Emergency Diesel Generators [DG] were operable and available. Crew recognition, response and decision making enabled effective management of the transient.

EVENT ANALYSIS

This event is being reported in accordance with 10 CFR 50.73(a)(2)(iv)(A) as an event or condition that resulted in manual or automatic actuation of any of the systems listed in paragraph 10 CFR 50.73(a)(2)(iv)(B).

The troubleshooting team initially identified a failed bypass valve loading cylinder in the mechanical hydraulic control system. The troubleshooting team was able to create a scenario mimicking control system oscillations, and was able to manually attenuate and minimize the effects of the oscillations. The bypass relay loading cylinder was found to be ineffective, was replaced, oscillation scenario was recreated, and results showed that the resulting control system oscillations had been significantly attenuated. No other failures or degradation had been identified at this point. It was realized that the conditions present when the scram occurred (i.e. speed load changer in control) may have to be recreated to fully complete troubleshooting due to lack of discovery of a failure that conclusively explained why the scram occurred.

The conclusion of the troubleshooting team was to start up the reactor and place the turbine generator on line per normal procedures. The plant was started up with extensive monitoring in place, including dial indicators on the speed relay, control valve relay, and bypass valve relay, and a recorder to monitor oil pressure at the load rejection pressure switches. Upon reaching a turbine speed where the speed/ load changer and speed governor took control, an oscillations ("bobble") was noted at both the linkage on the front standard and as detected on the recorder monitoring oil pressure at the load rejection pressure switches. At this point, the turbine was removed from service and the reactor was taken to cold shutdown.

A general work plan was created to disassemble and inspect components that would be expected to be worn consistent with such bobble. During the disassembly there was clear evidence of damage to the speed governor drive gear. Speed governor gear damage is typically caused by electrolysis due to circulating

currents which are the result of shaft grounding problems. The speed governor gear drive damage found was consistent with electrolysis based on a detailed visual inspection (e.g. frosted surfaces). Further investigation revealed additional electrolysis damage to the main shaft oil pump drive gear bearings, oil pump seals, and oil pump and control stub shaft journal bearing areas. Findings of electrolysis led to investigation of the turbine shaft grounding system which was found to be significantly degraded. Oil leaks had been fouling the shaft grounding braids, degrading their performance to the point where excessive shaft voltages were present for an extended period, sufficient to allow the observed electrolysis damage to occur.

CAUSE

The direct cause of the scram was the actuation of the Main Turbine acceleration relay (load rejection) pressure switches. The root cause is ineffective management of turbine lube oil (TLO) tank vacuum which resulted in oil build up on the turbine shaft resulting in fouled grounding braids. Oil and oil mist combined with dust and dirt and increased contact resistance degraded the effectiveness of the shaft grounding device.

- Operator round sheet had ineffective control bands for lube oil tank vacuum.
- TLO vacuum instrument calibration band and accuracy did not allow operator to make an accurate assessment of the condition.

The purpose of the shaft grounding device is to prevent damage to turbine generator components caused by circulating currents. Resulting circulating currents degraded the speed governor drive gear which resulted in governor bobble that manifested itself during speed load changer testing and caused pressure oscillations at the acceleration relay (load rejection) pressure switches.

SAFETY SIGNIFICANCE

The safety objective of both RPS and PCIS are to provide timely protection at the onset of conditions that could challenge the integrity of the fuel barrier and nuclear system process barriers. The RPS prevents the release of radioactive material from the fuel and nuclear system process barriers by terminating excessive temperature and pressure increases through the initiation of an automatic plant shutdown. PCIS prevents release of radioactive materials by isolating the reactor vessel and closing containment where required. For this event, the RPS, PCIS, and plant safety systems functioned as designed and fuel and nuclear system process barriers remained intact. Consequently, the event did not have an adverse impact on the health and safety of the public and was not considered a safety system functional failure.

CORRECTIVE ACTIONS

- Repairs were made to the speed governor gear drive components and main shaft oil pump components which were damaged by electrolysis.
- A modification was performed to install a more robust grounding apparatus with the ability to remotely monitor its operation while minimizing dose to maintenance personnel.
- Replace PI-7876 Turbine Lube Oil Tank Vacuum Indicator with High Accuracy Device. This includes updating the operator round sheet (2010) to reflect new control bands as required which will allow more accurate indication and better control of vacuum.
- Revised 4118-PM, Main Generator/Recirc Motor Generator Electrical Checks, to include vendor recommendations for 1) method, 2) frequency, and 3) acceptance criteria.

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NARRATIVE

PREVIOUS SIMILAR EVENTS

There have been no similar licensee event reports in the past three years.